Tupus diluculum sp. nov. (Protodonata), a giant dragonfly from the Upper Carboniferous of Britain

P. E. S. Whalley

Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD.

Synopsis

A description is given of *Tupus diluculum* sp. nov., Insecta, Protodonata, from the Westphalian A (Upper Carboniferous) of Derbyshire.

Introduction

The discovery of a fossil dragonfly with a wingspan of about 200 mm, larger than any living dragonfly, was recently recorded (Whalley 1978a, b, 1979) from a colliery at Bolsover, Derbyshire; it was found some 600 metres below ground. The interest aroused by this insect undoubtedly led to the discovery of a second specimen of a different species in dark grey shale in the same coal mine. The new dragonfly had an estimated wingspan of over 500 mm, making it the largest ever found in Britain. It was found in the same bed and at almost exactly the same height above the coal seam as the previous one, but at some distance from it. Thus it is likely that these two insects were contemporaneous, flying at the edges of the coal forests. The size of the wings makes it unlikely that they flew in thicker parts of the forests and, perhaps like present-day dragonflies, they kept to the margins of fresh water and to the more open parts of woods.

The specimen, which is a hindwing, is broken with some fragments missing, thus precluding an exact measurement of it, but at a conservative estimate the length of one wing was not less than 250 mm. From its venation it is evidently a species of the genus *Tupus* Sellards (Meganeuridae, Tupinae; = Typinae, *sensu* Carpenter 1939 : 37). Species of the subfamily Tupinae are known from the Permian and Upper Carboniferous of Russia and America. The new specimen is extremely similar to *Tupus permianus* Sellards 1906, from the Permian of America (Professor F. Carpenter, *in litt.*), but is much larger. This suggests a remarkable stability of wing venation over 20 million years or more.

Systematics

PROTODONATA, MEGANEURIDAE

DIAGNOSIS. Dragonfly-like insects which lack the nodus, arculus and pterostigma of typical Odonata.

Subfamily **TUPINAE** Handlirsch, 1919

[*nom. correct. & transl.* Whalley, herein (*ex* Typidae Handlirsch, 1919: 572)]

Genus ***TUPUS*** Sellards, 1906

The family-group name Typidae[1] Handlirsch, 1919, was based on the unjustified emendation of the generic name to *Typus*, adopted by Sellards (1909 : 151) and followed by Carpenter (1939, 1960) and many others.

DIAGNOSIS. Rs forks near middle of wing. Subcosta very long.

Tupus diluculum sp. nov.

DIAGNOSIS. Hindwing, maximum width 50 mm. Total length of fragments 235 mm; estimated total wingspan over 500 mm. The costal margin near the base is slightly toothed. The wing

[1]Application has however been made to the ICZN for conservation of the generic name *Typus* and the family-group name Typidae.

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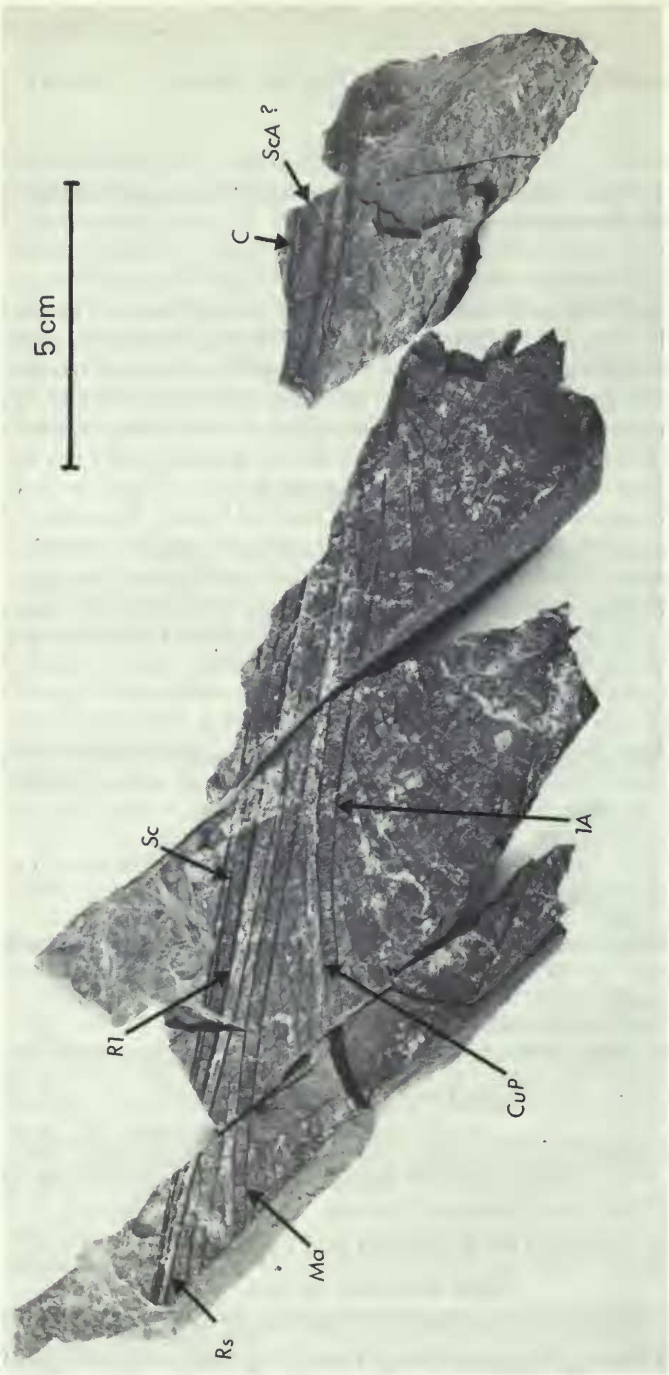

Fig. 1 *Tupus diluculum* sp. nov. Holotype, hindwing. Upper Carboniferous, Westphalian A; Bolsover Colliery, Derbyshire, England. ×¾. 1A, first anal. C, costa. CuP, posterior cubitus. Ma, anterior media. R1, first radial. Rs, radial sector. Sc, subcosta. ScA, anterior subcosta.

impression is preserved upside down (no counterpart). Vein Rs first divides near the middle of the wing. The anterior branch of Ma and posterior branch of Rs run parallel towards the wing margin for most of their length. Similarly CuP and 1A are very evenly separated across the wing. The figure (opposite) shows the veins preserved near the base but it is not possible to determine whether the mark near the base of the costa (ScA? in the figure) is really a trace of vein ScA.

NAME. Diluculum, Latin, dawn.

HOLOTYPE. Hindwing, Upper Carboniferous, Westphalian A; Bolsover Colliery, Derbyshire, Deep Hard, from roof of seam 15–17 cm above coal, about 600 m deep; coll. G. Ball, 10.8.1978; In.64553 in BM(NH), presented by the National Coal Board.

DISCUSSION. This species can be distinguished from all other *Tupus* by its large size. The subcosta is very long, reaching three-quarters of the way along the costa. *Tupus diluculum* not only extends the geographical range of the genus, species of which are known from Russia and America, but also shows that large size was reached some 10–20 million years before the famous giant fossil dragonflies from Commentry, France (Laurentiaux 1953). Although the species from Commentry are in the same family as the one from Derbyshire, they are currently placed in different subfamilies. *T. diluculum* is the largest known insect from the Westphalian A and certainly the earliest of the giant dragonflies.

Acknowledgements

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